

METHOD AND APPARATUS FOR RELOCATING A PART OF A SERVICE LOGIC PROGRAM AND FOR COMMUNICATION BETWEEN THE RELOCATED PART AND THE PART OF THIS SERVICE LOGIC PROGRAM REMAINING AT THE SERVICE PROVIDER IN AN

5 INTELLIGENT NETWORK

BACKGROUND OF THE INVENTION

INSA1 ^{1, 2} A farther and farther reaching use of the technology of intelligent networks IN is being made in the field of telecommunications. What is thereby involved is an architectural concept that, among other things, allows network operators to define and offer telecommunication services for their customers in a simple way. The architecture can be applied to many telecommunication networks such as, for example, PSTN or N-ISDN.

INSA2 There are three critical function units in an intelligent network:

- ^{1, 2, 3} ~~call handling functions (for example, call handling, the basic functions of telecommunication networks)~~
- 15 • ~~service execution functions (for example, switching, resource control)~~
- ~~service management functions SMF (including development, offering, administering IN services)~~

a One result of the SMF is the service logic program that can be loaded onto a service control point SCP and be implemented ^{in the SCP} thereat. It is also possible to distribute this service logic onto a plurality of SCPs, ^{wherein} whereby a complete copy of the service logic program is ~~respectively~~ employed ^{here}. The service logic program is implemented when a service call from a service user arrives at a switching center (service switching point SSP).

a An important point in producing services in an intelligent network is charging for these services. ^{Hence, the service logic} The service logic thereby generates a charge information (charging ticket), ^{Such as} for instance in the form

a TC_CONTINUE(FurnishChargingInformation, SendChargingInformation, Connect) (see Q.1218 with respect thereto). ^{for example} These information are delivered to a central location (billing center) and processed there. The data contained therein are employed

for charging the account of the customer or ^{for instance} in the case of "free phone" ^{for instance,} the account of the service subscriber or both accounts.

A special characteristic of this procedure is the possibility of also modifying the current charge rate during an existing connection, ^{such as} ~~for instance~~ upon entry into a new rate time, discount given long calls or the like.

With the intensified introduction of computer telephony integration (CTI) and the continued development of distributed applications like Java, the services offered in the IN will also change in future. For this purpose, it will become necessary to install "more intelligent" devices at, for example, the ultimate consumer. In order to also completely exploit the additional possibilities of these devices, it will be necessary to expand the concept of the intelligent networks.

^{SUMMARY OF THE INVENTION}
An object of the invention is to offer service providers and service users in a communications network a more flexible possibility of having the service logic needed for an offered service run.

^{and other objects are by}
This object is achieved in that a method is defined with which various parts of a service logic can be distributed onto various entities of a system and can collaborate and communicate with one another ^{at the various entities} ~~thereat~~. An apparatus is specified with which a customer of an intelligent network can use a service at a provider, the service logic thereof running partly centrally at the service provider and partly relocated, for example, in the terminal equipment of the customer.

The definition and offering of new services becomes possible due to the division of the service logic into a centralized part and a decentralized part. For example, additional information about connections can be made available to the customer, these being capable of being further-processed or interpreted in some other way. Momentarily existing media failures can be avoided. For instance, the customer searches a telephone number via his PC and immediately dials the desired number by pressing a button at the PC. Further usage possibilities of the connections for which a "more intelligent" terminal device is required can be opened up.

~~Advantageous developments and improvements are provided in the~~

30 ~~subclaims.~~

The division of the service logic thereby derives from the type of logic and
 the service realized ^{according to the present invention} ~~therewith~~. In most instances, it will be ^{Signif: can't} ~~meaningful~~ to place the
 relocated part of the service logic on the terminal equipment of the customer. It is also
^{Signif: can't} ~~meaningful~~ to use the connections ^{e.g.} (for example, ISDN) that already exist between the
~~central entity and the relocated part, i.e., for instance, the terminal equipment.~~ That
 part of the service logic that is responsible for generating the charge information must
 be given special consideration.

~~The invention is explained below on the basis of exemplary embodiments.~~
~~The Figure thereby shows a possible structure with a part of an intelligent network.~~

10 The Figure shows a schematic arrangement of the distribution of a service
 logic in an intelligent network IN and the communication between the parts of the
 service logic required therefor.
~~The central part of the service logic DL is thereby located in the service control point~~
 SCP. The relocated part of the corresponding service logic DL' is located on the
 15 telecommunication terminal equipment TE of the service user in this example. The
 two parts of the service logic are connected to one another by a local exchange OV.
 The terminal equipment is thereby connected to the local exchange OV with an ISDN
 line. For example, the control signals are communicated on this connection with
 facility information elements FIE via the D-channel of the ISDN line. The local
 20 exchange OV is in turn connected to the service control point SCP on which the
 central part of the service logic runs. This connection occurs with the expanded INAP
 (intelligent network application protocol). At the other side, the service user is also
 connected via the local exchange to a switching node (service switching point SSP) of
 the intelligent network.

25 In this case, ~~for~~ for the communication of the relocated part of the service
 logic DL' with the central part of the service logic DL can be implemented on the SCP
 with communication mechanisms that are already known and that must be somewhat
 expanded for this purpose.

30 The data communication connection between the relocated parts and the
 central part of the service logic must meet the following demands:

On page 3:

line 2, replace "therewith" with --according to the present invention--;
and replace "meaningful" with --significant--;

line 4, replace "meaningful" with --significant--; and replace "for
5 example" with --e.g.--;

replace line 5 with the following: ~~central entity and the relocated~~
part (i.e., the terminal equipment). The--;

~~delete lines 8 and 9 and insert the following:~~

--Additional advantages and novel features of the invention will be
10 set forth, in part, in the description that follows and, in part, will become
apparent to those skilled in the art upon examination of the following or may
be learned by practice of the invention. The advantages of the invention
may be realized and attained by means of the instrumentalities and
combinations particularly pointed out in the appended claims.

15 **BRIEF DESCRIPTION OF THE DRAWINGS**

Reference is made to the attached Figure. This Figure shows a
structure with a part of an intelligent network according to an embodiment of
the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

20 line 13, replace "The" (first occurrence) with --A--; ~~delete~~ "thereby";
and replace "the" (third occurrence) with --a--; and
line 25, ~~delete~~ "[...] for the".

On page 4:

replace lines 1-13 with the following paragraph:

25 --the connection is automatically operational when the device that
contains the relocated part is connected or turned on; high outage

A3

A4

A5
cont

INS A5

- ~~the connection is automatically operational when the device that contains~~
~~the relocated part is connected or turned on;~~
- ~~high outage dependability and recovery capability after a connection~~
~~outage;~~
 - 5 • ~~employment of the existing physical connections of the external device to~~
~~the IN;~~
 - ~~parallel payload channels dare not be influenced.~~

~~The service logic must thereby satisfy the following conditions.~~

- 10 • ~~no manual interventions needed at the device for administration and~~
~~operation;~~
- ~~security assured, for instance by unambiguously assigned identities,~~
~~whereby the existing numberings should be employable for the addressing;~~
- ~~suitable for a multitude of device types and interfaces.~~

What are referred to as facility information elements FIE can be employed
 15 in this case for the first part of the link that, for example, leads via an existing ISDN
 connection from the service user to the local exchange. The D-channel provided for
 signalling in ISDN can be employed as ^aconnecting path. These FIE elements are
 already known from the ETS 300 196-1. ^a~~They are inventively~~ *The FIE elements* assigned the job of
 functioning as containers for IN services. The content of these FIEs, normally referred
 20 to as "component", is "pre-"used in order to control what are referred to as
 supplementary services. The exact structure of the components is subject to the rules
 of BER and ASN.1. No expansion in the definitions of the FIE in the Standard is
 necessary.

User to service information (USI) signalling has already been designed for
 25 "call unrelated services" such as, for example, the short message service. This is
~~thereby~~ composed of two parts: the service-to-user information (STUI) part and, in the
 opposite direction, the user-to-service information (UTSI) part.

Up to now, this signalling was not yet employed for the service control. As a result of
 an expansion of the USI method standardized in the INAP, the control of the service
 30 logic can be implemented here via the CCS7 network that already exists.

The following operations must be transferred from the norm Q.1218 (in a more recent generation, Q.1228, Capability Set CS-2 for intelligent networks) and must be adapted or, ~~respectively~~, recreated:

ReportUTSI	(OV→SCF)	Reports UTSI information elements (like SSF-SCF interface)
RequestReportUTSI	(SCF→OV)	Requests the monitoring of UTSI elements (like SSF-SCF interface)
SendSTUI	(SCF→OV)	Requests an STUI information element at the SSF (like ITU-T Q.1228 SSF-SCF).

In this solution, one is dependent on the existence of an ISDN connection to the terminal equipment. In order to assure a greater variety of terminal equipment and interfaces, a further possible realization composed of [®]Java technology is available. A programming interface ~~is already prepared for this~~, what is referred to as the Java [®]telephony application programming interface ~~JTAPI~~. *(JTAPI is already prepared for this)*

A description of ~~this~~ ^{JTAPI} is found, for example, at <http://java.sun.com/products/jtapi>.

Applications in the telecommunications area can be realized in a simple way with the object-oriented development environment in the modular system. The JTAPI call model is composed of six different Java [®]objects that respectively represent a conceptual or physical entity in the telecommunication. Various hardware platforms and software interfaces are covered ^{and} a security mechanism is likewise already provided. (Java is a trademark of Sun Microsystems.)

The charge information is again considerably separately below. It can be ~~significant~~ ^{meaningful} that a charge information ticket is not generated from the central entity but from the part of the service logic that is located in the relocated part of the service logic.

The transmission of the charge ticket ^{is performed} ~~ensues~~ according to the same strategy that was already described in detail above. ~~What is thereby involved is the charging function in conformity with the contract between network operator, subscriber and customer.~~ ^{Transmission of the charge ticket includes}

It

~~Since it~~ must be assured, however, that no fraudulent tickets proceed to the billing center, which then processes the tickets.

Falsifications can be prevented by traditional methods like the insertion of a signature.

Another possibility of preventing fraudulent tickets is performed by checking all charge

5 tickets with the central part of the service logic. Thus, the charge tickets of the relocated part of the service logic are viewed as "proposals" or "drafts" that can be accepted, modified or rejected by the central part of the service logic before they are forwarded for final processing to the billing center (the central entity that monitors and logs the charging of the service offering).

10 When the central part of the service logic receives such a charge ticket, it should review the plausibility of the requested charge. Insofar as this is assured, the ticket can be forwarded to the billing center with or without changes.

When the charge tickets received from the relocated entity are not correct or fail to arrive, the central part of the service logic must trigger a reaction. This can occur due

15 to transmission errors or as a result of an explicit manipulation. Possible reactions are, for example, the immediate release of the connection, generating a "fraud ticket" or at least overwriting the incorrect ticket.

NSA6 1/46

~~List of References~~

- ~~ETS 300 196-1 (August 1993)~~
~~Integrated Services Digital Network (ISDN);~~
~~Generic functional protocol for the support of supplementary services; Digital~~
5 ~~Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol Specification~~
- ~~ITU-T Recommendation Q.1218 (10/95)~~
~~Intelligent Network,~~
~~Interface Recommendation for Intelligent Network CORRESPONDS-1~~

~~List of Abbreviations~~

- 10 ~~ASN.1 Abstract Syntax Notation 1~~
~~BER Basic Encoding Rules~~
~~CCS7 Common Channel Signalling No. 7~~
~~CTI Computer Telephony Integration~~
~~FIE Facility Information Element~~
15 ~~INAP Intelligent Network Application Protocol~~
~~ISDN Integrated Services Digital Network~~
~~ISUP Integrated Services User Part~~
~~ITAPI Java Telephony Application Programming Interface~~
~~PSTN Public Switched Telephone Network~~
- 20 ~~USI User to Service Information~~
~~UTSI User to Service Information~~
~~SCCP Signalling Connection Control Part~~
~~SCF Service Control Function~~
~~SCP Service Control Part~~
- 25 ~~SMF Service Management Function~~
~~SSP Service Switching Point~~
~~STUI Service to User Information~~
~~TCAP Transaction Control Application Part~~